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THE LOCATION OF THE CHEMICAL INDUSTRY IN THE USSR

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German Editor's Note: This article supplements the one on the Soviet chemical industry in the October 1949 issue, and also corrects it on the basis of new information.

The following is an attempt to show the distribution of the chemical industry in the Soviet Union according to the latest data. No claim, however, is made for the completeness nor for the complete reliability of the data. This fact will be understood by every expert on the Soviet Union. When, for example, the world press reported several weeks ago the existence of a huge underground plant for processing uranium in Armenia (near the Turkish border), it was difficult to recognize the deception of such a report because of its factual detail.

For the sake of clarity, we have given first, a general survey of the distribution of the chemical industry, and then a discussion of its most important branches.

Chemical Industry of European USSR

It is frequently believed that the center of the Soviet chemical industry is located in the Asiatic part of the country, but this idea is not conclusive. A substantial shift to the East has taken place during the last 10 years, and this tendency, not based on strategic reasons alone, still prevails. The execution of such a project, however, will require an even longer time inasmuch as the new areas, in most cases, will have to be made accessible to transportation and settlements.

Therefore, European USSR is still the center of the USSR chemical industry, which may be divided into the following five principal production regions:

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1. The northern region, extending from the Kola Peninsula to Leningrad and the Baltic States, concentrates on the production of wood-carbonization products, rosin-distillation products, sulfuric acid, superphosphates, aluminum, and synthetic rubber.

2. The Moscow region concentrates on the production of sulfuric acid, synthetic rubber, insecticides, and pharmaceuticals.

3. The Ukraine is the coal chemistry base as well as a center for producing sulfuric acid and superphosphate.

4. The Caucasus is the center for petroleum chemistry, carbonization of wood, and ferroalloy and metal compounds production.

5. The Urals region, with its huge raw material reserves and their corresponding branches of industry, concentrates on the production of sulfuric acid, soda products, water glass, bichromate, abrasives, bromine, iodine, aluminum and aluminum compounds, copper salts, ferroalloys, calcium carbide, oxygen, phosphorous and nitrogenous fertilizers, and wood-carbonization products.

Wood and Phosphate Chemistry in Northern Russia

Of the 172 million hectares of wooded area in European USSR, Northern Russia has a total of 84 million hectares, with a useful timber supply of 4,784,000,000 linear meters, an annual timber increment of 90 million linear meters, and a yield of 66 million linear meters. During the past few years, timber exploitation has been shifted to the North because of the exhaustion of central Russian and north Ukrainian wooded areas. Modern plants for rosin and wood distillation are under construction, particularly near the Dvina, Svir, and Pechora rivers, on the coast of Lakes Ladoga and Onega, and on the Baltic-White Sea Canal. The most important wood-chemical enterprise is the Segezha Combine in Karelia which was completed in 1948, and produces cellulose, paper, turpentine, rosin, soap, and wood-distillation products.

As compared with their rich material reserves, the capacity of the older wood-carbonizing and rosin-distilling enterprises is rather small. These enterprises are located in the Leningrad area, in Narva, Riga, Vil'nyus, and in the former Polish parts of the Russian-annexed Poles'ye, Novogrodek, and Bialystok wojewodztwos.

Of great significance for fertilizer manufacture are the phosphate deposits on the Kola Peninsula located in the extreme north between the White Sea and Barents Sea. They consist of apatites with nepheline with 28 - 36 percent of phosphoric acid. The reserves are estimated to be over 2 billion tons. The crude ore is first concentrated at a dressing installation in Kirovsk to a concentrate of 40 percent of P_2O_5 and then transported via the Murmansk Railroad Line to Leningrad and other superphosphate centers. A substantial part of the output is exported to other countries via Murmansk. Crude ore mining on the Kola Peninsula amounted to approximately 3 million tons in 1939, and has been estimated at 3.5 million tons in 1949.

A valuable raw material base for sulfuric acid and, therefore, for the northern superphosphate industry, are the pyrite deposits discovered in 1947 in the Segezha area, several kilometers east of Lake Idel' and 15-20 kilometers west of the Kochkoma Railroad Station.

The large bauxite deposits near Tikhvin became the base for an advanced aluminum industry consisting of two large combines, one in Tikhvin and the other on the Volkhov River, 15 kilometers above the point where the Volkhov River flows into Lake Ladoga. Reconstruction of both combines has been completed and supplemented by the installation of dismantled plants from the Eastern Zone of Germany. In addition to Tikhvin bauxite, the plant on the Volkhov also processes nepheline concentrates from the Kola Peninsula, thus producing alkalies as a by-product. The bauxite reserves in Tikhvin amount to 9 million tons, while the deposits in the Urals are 10 times as great.

The recently explored northern petroleum regions and the Vorkuta coal deposits are not yet of great significance to the chemical industry. The north Estonian shale area, however, has become a manifold raw material source for fuel, oil products, and shale gas. Recently, a kind of varnish of value to the dye industry was produced from shale oil.

Kokhtla-Yarve is the center of the shale oil region, the reserves of which total 5 billion tons, according to the latest estimates. Within the next few years the annual output is expected to reach 10 million tons, equivalent to the production of 2 million tons of crude oil. Processing of shale now takes place in modern low-temperature carbonizing plants.

Of particular significance is the fact that the residues obtained by low-temperature carbonization contain uranium, and are therefore further processed in the interior of the USSR. This finishing process has been undertaken on a large scale since the huge waste dumps formed during the prewar period are still available. The recently reported uranium deposits in the immediate vicinity of Kokhtla-Yarve may merely be these shale residues.

Varied Production in Central Russia

The Moscow area, including Yaroslavl' and Gor'kiy oblasts, contains heavy-chemical and fertilizer plants, and factories producing synthetic rubber, pharmaceuticals, cosmetics, dyes, plastics, insecticides, ferroalloys, and wood-carbonization products. With only a few exceptions, most of these plants are of medium size with a limited production capacity. They were converted to armament production during the war and were later expanded by the addition of German dismantled installations.

This region does not have very rich chemical raw materials with the exception of phosphate deposits, which up to now have been exploited only to a small extent, since the superphosphate plants in Voskresensk and Chernorech'ye were supplied with crude phosphates from other regions. However, with the recent emphasis on utilization of local raw materials to relieve railroad traffic and to prevent interruption of production in a possible war, the above-mentioned fertilizer plants have been converted to local phosphates exclusively.

Reconstruction in the Ukraine

The chemical industry of the Ukraine is based on Donets coal, Nikopol' manganese, and various phosphate deposits. Coal production in this area amounted to 85 million tons in 1948 and is to reach 88 million tons in 1950. The coal reserves are estimated at 90 billion tons, of which about 60 percent can be used industrially. Recently, the coal base was augmented by new lignite deposits west of the Dnepr River.

The period after World War I saw the development of a nitrogen industry, based on the coal deposits, which in its first phase consisted only of coke plants with by-product manufacture, e.g., ammonium sulfate. Later, three large plants for nitrogen synthesis were constructed: the nitrogen plant in Stalino, the "Sergo Ordzhonikidze" Chemical Combine in Gorlovka, and the nitrogen combine in Dneprodzerzhinsk. All three enterprises were considerably damaged during World War II, but were reconstructed in a relatively short time.

The following sulfuric acid, superphosphate, and soda plants of the Ukraine were also virtually destroyed during the last war; however, a recent report suggests the completion of their reconstruction during 1948: the sulfuric acid and

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superphosphate plant in Vinnitsa, the sulfuric acid and superphosphate plant in Odessa, the "Stalin" Chemical Plant in Konstantinovka, the sulfuric acid installation of the Gorlovka Chemical Combine, the "Slavsoda" Soda Plant in Slavyansk, and the "Donsoda" Soda Plant in Lisichansk. Both soda plants are again in full operation and were commended for their achievements in recent Soviet newspapers.

The Nikopol' manganese reserves total 500 million tons and the manganese content of the ore ranges between 35 and 48 percent. The mines not only have been restored, but even expanded and modernized to such an extent that ore mining in 1950 is scheduled to reach the prewar level of 1.2 million tons.

The "Zaporozhstal'" Steel Plant, the largest prewar enterprise for the production of ferroalloys, uses Nikopol' ore for the production of ferromanganese. This plant, virtually destroyed during World War II, has not yet been fully restored; according to a Soviet report, the first phase of reconstruction was completed in October 1948. In addition to ferromanganese, ferrosilicon is again in production; before the war the production program also included ferrochromium and ferrotungsten. The manufacture of the latter in particular will be increased, since tungsten deposits were discovered last year in the Ukrainian manganese mines. Until now, tungsten had to be transported from Siberia.

With the incorporation of the western Ukrainian regions, the USSR obtained the important petroleum centers of Borislav and Stanislav, and refinery installations in Drogobych. The petroleum output, which reached 380,000 tons in 1938, is supposed to total 300,000 tons at present.

Caucasus Petroleum Center

Petroleum production in Baku, Groznyy, and Maykop amounted to 28 million tons, or 88 percent of the total petroleum output in the USSR, in 1939. Although war damages in the first two regions have been repaired, production has not returned to the prewar level because of the gradual exhaustion of the oil fields. Of the total yield of 30.6 million tons of petroleum in 1938, the Caucasus produced 20 - 21 million tons, or approximately two thirds of the total output. Despite the relative decline in Caucasus petroleum production, this region will maintain its leading role because of the utilization of petroleum and natural gas as raw materials for organic synthesis. It has been planned to start production of a series of organic chemicals, solvents, intermediate products, and synthetic washing agents in large quantities according to the American pattern.

Moreover, synthetic rubber production based on petroleum has been intensified: ethylene from refinery gases is converted into ethyl alcohol, which is transformed by catalytic process into butadiene and the latter is then polymerized under pressure. This process, which has been employed for 10 years at the Sumgait Refinery, is now to be utilized to a greater extent. Of the 250,000 tons of synthetic rubber planned for 1950, 25,000 tons are to be produced by the ethylene process, 75,000 tons by the calcium-carbide process, and the remainder by the alcohol process.

The Rubber Combine in Yerevan is employing the carbide process, which was adopted from the US DuPont Corporation, and has the largest capacity for carbide, 60,000-70,000 tons. A second carbide plant with a capacity of 20,000 tons is located in Kirovakan.

A remarkable pharmaceutical and cosmetic industry, based on local drugs and volatile oils, has developed in the Caucasus. The Transcaucasus Institute of Pharmacology and Medicinal Herbs succeeded in planting cinchona trees in the Caucasus, thus providing the raw material for an antimalaria remedy. Volatile oils are being manufactured by an Oktemberyan enterprise which is still under construction.

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The Tbilisi Pharmaceutical Plant produces quinine preparations, extracts of belladonna, urotropin, and other pharmaceuticals, and started to manufacture penicillin in 1948. Other pharmaceutical plants are located in Batumi, Zugdidi (Georgia), and in the vicinity of Baku.

A new dye factory in Yerevan, in operation since 1947, produces 2,500 tons of dry dyes per year from local raw materials.

The manganese reserves of Chiatura, amounting to 175 million tons, are inferior to the Nikopol' deposits in quantity, but superior in quality, with a manganese content of 52 percent. The prewar production of approximately 1.6 million tons has already been exceeded and is to reach 2 million tons in 1950. The total Soviet manganese output is to reach approximately 3.5 million tons, including 300,000 tons mined in the Urals and the Kuznetsk Basin.

Activity in the Urals

The possibilities for wide-scale development of the chemical industry in the Urals cannot be overestimated. There are enormous supplies of raw materials as well as a highly developed local chemical industry which extends over this large area. It is logical to assume that the Soviet government will make even greater use of this gigantic potential.

The industrial potential which has been created on both sides of the Urals in recent times is impressive. In the western part of this region, between the Ural Mountains and the Volga River, the petroleum and oil shale industry (Ishimbay region) has been expanded according to plan since 1934. Opinions about this "second Baku" differ. It has been established that important petroleum sources do exist here, but the wells are relatively shallow and the number of underlying horizons is not comparable to those of the Caucasus fields. The chemical composition of the petroleum (high sulfur content) makes its processing difficult. Despite this, further development of this region is being continued since the Caucasian oil fields are gradually drying up. Production increased from 1.3 million tons in 1938 to about 4 million tons in 1947 and 5 million tons in 1948; a yield of 8 - 9 million tons in 1950 is expected.

Iron and copper pyrites, phosphates, potassium salts, bauxite, and timber are among the raw materials which are available to the chemical industry in the Urals. The mining of iron pyrite amounts to over one million tons per year, large amounts of which are used by the ten sulfuric acid plants located in the Urals. A large part of the iron pyrites has to be shipped to other sulfuric acid plants in various parts of the country. The large copper pyrite deposits of the Urals have only recently been used to produce sulfuric acid. Formerly, the sulfur in copper pyrites was allowed to escape in the exhaust gases formed in refining the copper. By using the sulfur which is present in the copper, lead, and zinc ores, it is hoped to increase greatly the raw materials needed in producing sulfuric acid.

The phosphates which are found in many places in the Urals are now being systematically mined and used in the local superphosphate industry.

The Soviet Union has an extremely rich potassium deposit near Solikamsk. The potassium metal content of the definite reserves amounts to at least 18 billion tons, which makes this the richest potassium deposit in the world. Full-scale mining of the deposit began in 1934 under German technical assistance. Although its location presents transport difficulties, the Solikamsk deposit is so large that other potassium deposits in Saratov Oblast and in the Kazakh and Uzbek republics no longer need to be exploited. The potassium deposits in Galicia which were taken from Poland are again in full operation. The combined production of the Solikamsk and Galician deposits will probably reach 700,000 tons of K_2O in 1950.

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The Ural chemical industry has been so systematically developed and directed toward specific purposes that now almost every branch of the industry is represented there. Sulfuric acid plants in Berezniki, Krasnoural'sk, Kirovgrad, Molotov, Pervoural'sk, Krasnoufimsk, Polevskoy, and Chelyabinsk form the center of the chemical industry. The Krasnoural'sk and Molotov plants are also equipped to produce superphosphate, and there is in addition a superphosphate plant in Sverdlovsk. At Berezniki there is a large soda plant. Bromine is produced in Solikamsk, and bromine and iodine in Chusovoy. Important iron alloy plants are located in Chusovoy, Nizhniy Tagil, Ufalei, Chelyabinsk, Satka, Orsk, and Chkalov. The Orsk-Khalilovo Metallurgical Combine, in the Southern Urals, will be the most important plant in the USSR for the production of chromium-nickel steel from natural alloys, once it starts full scale operations in 1950.

Kamensk, located on the Iset River in the Central Urals, has become the center of the Soviet aluminum industry. The plant in Kamensk was opened in the fall of 1939, and for some time during the war, when the plants in northern Russia and the Ukraine were lost, was the only aluminum producer in the USSR. The plant has been enlarged and now has a capacity of approximately 75,000 tons per year. During the war, another aluminum plant was built in Krasnotur'insk in the Northern Urals which has a present capacity of 35,000 tons per year. The combined yearly capacity of all Soviet aluminum plants is almost 200 million tons. It can safely be predicted that the USSR will replace Canada as the second largest producer of aluminum in the next few years. Soviet production reached 120,000 tons in 1949, and probably will rise to 150,000 tons in 1950, since plants in the northern and southern parts of the western USSR will again be in full production.

A detailed description of the development of the chemical industry in the Asiatic USSR and of the systematic organization of its branches will follow in the next issue.

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